Space Weather Forecast

Issued on Sunday 23 March 2025 at 12:54 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor to Moderate Geomagnetic storms possible each day. Chance of Strong Geomagnetic storm day 1 (23 Mar).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low in the past 24 hours, with occasional Common-class flares. There are nine sunspots on the Earth facing disc, the vast majority of which are relatively small and magnetically simple and either stable or in slight decay. One in the northwest quadrant remains the most significant group, after a period of rapid growth, it has begun to consolidate within both the leader and trailer portions, though has seen a recent simplification in its magnetic classification.

A faint but quite wide angle coronal mass ejection was observed leaving the sun possibly associated with a filament lift-off from just south and east of centre disc, between 22/1300-1500 UTC. The lack of STEREO-A imagery has impeded the ability to triangulate this coronal mass ejection as definitively near or far sided, so a risk of an arrival on 24 Mar has been included.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of a weak transient and/or coronal hole influences. Peak speeds of elevated were observed around 22/1900UTC, with an erratic reduction to slight elevated thereafter. Interplanetary Magnetic Field was initially moderate but soon declined to current weak levels. The north-south component was weak and on a declining trend, and mostly negative. Geomagnetic activity was Quiet to Active (Kp 2-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low activity is expected, with a slight chance of further isolated M-class flares.

Solar Wind / Geomagnetic Activity: A faint halo coronal mass ejection was observed at 21/1558 UTC. This has been analysed as arriving at Earth during day 1 (23 Mar) bringing elevated to strong solar winds speeds. There is a second coronal mass ejection, originating around 22/1400UTC, which is of lower confidence. This may arrive at Earth on day 2 (24 Mar). Otherwise, solar winds are expected to continue slightly elevated to elevated initially, but are likely to become enhanced further with the first coronal mass ejection arrival, perhaps reaching strong levels. Solar winds

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should then gradually decline through 24 and 25 Mar, before the potential arrival of the coronal hole fast wind from late 25 into 26 Mar.

Unsettled to Active geomagnetic conditions are likely initially, before rising to G1/Minor to G3/Strong storming due to possible combined fast wind and coronal mass ejection influences through day 1 (23 Mar). There is a chance of G1/Minor storms due to possible lingering coronal mass ejection effects/possible coronal mass ejection arrival on day 2 (24 Mar), then again on days 3 and 4 (25/26 Mar) due to the arrival of the coronal hole fast wind.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to persist at background levels, with a slight chance of enhancement from any larger flares.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	50	30	50
Strong	G3	No	30	20	1	5
Severe	G4	No	5	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	No	35	35	35	35
Very Active	R3-R5 (X Class)	No	1	1	1	1

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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